Meteorological record of voluntary observers, etc.—Continued.

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
North Carolina.	°	°	°	*Inches*
Chapel Hill	63	2	33.4	.....
Lenoir*	60	—12	.....	6.50
Lincolnton	62	— 7	31.1	6.19
Raleigh *	65	5	37.0	2.40
Reidsville *	69	—10	26.7	1.75
Statesville*	61	— 8	34.8	5.97
Wake Forest*	65	2	36.0	2.99
Weldon *	63	8	34.7	2.88
Ohio.				
Cleveland	54	— 8	24.3	3.17
College Hill*	56	—18	19.6	4.59
Fostoria *	50	—11	20.5	3.03
Garrettsville	53	—19	20.7	4.45
Hiram	52	—10	21.1	4.34
Jacksonborough*	58	—19	23.0	3.20
McConnelsville*	58	—10	25.1	4.03
Napoleon	53	— 9	22.7	2.25
North Lewisburg	53	—14	24.4	4.30
Ruggles*	52	— 8	22.7	2.90
Tiffin *	54	— 9	21.5	2.43
West Milton	59	—14	25.0	4.00
Wauseon	52	—14	19.0	2.78
Westerville	54	—12	23.3	3.16
Yellow Springs	58	—14	20.3	3.67
Oregon.				
Albany*	57	18	38.8	9.92
Bandon*	54	26	42.4	13.72
East Portland *	50	10	.....	5.08
Eola *	55	14	36.3	9.46
Klamath, Fort	50	—13	27.8	3.62
Pennsylvania.				
Blooming Grove *	52	—15	22.1	3.90
Catawissa *	60	—13	23.2	4.50
Dillingersville	58	0	26.6	6.25
Dyberry*	51	—18	19.9	2.85
Easton	.....	.....	.....	3.08
Fallsington	56	— 3	25.8	4.12
Franklin*	56	—17	19.0	4.86
Germantown*	52	— 3	.....	5.89
Grampian Hills*	50	—20	19.5	4.27
Quakertown *	53	— 4	24.0	3.68
Troy *	49	—23	18.8	4.18
Wellsborough *	52	—15	23.3	12.17?
West Chester	56	— 3	25.4	5.98
Wysox	53	—14	22.3	3.54
South Carolina.				
Aiken*	66	6	40.5	3.40
Kirkwood *	42	— 1	34.2	2.61
Pacolet *	63	2	34.2	6.95
Spartanburg	62	1	36.5	8.70
Statesburg*	64	6	39.0	2.48
Tennessee.				
Ashwood	57	— 7	25.0	4.30
Austin *	59	—19	30.8	2.66
Milan	59	—11	27.5	6.04
Paris *	62	—14	29.2	.....

Stations.	Temperature. Maximum.	Minimum.	Mean.	Rainfall.
Texas.	°	°	°	*Inches*
Austin *	73	6	42.6	0.97
Clark, Fort	86	10	47.7	0.12
Cleburne *	72	— 3	32.2	1.81
Comfort*	76	6	.....	0.56
Concho, Fort	80	3	38.9	0.15
Corsicana	.....	.....	.....	3.18
Huntsville *	74	4	.....	2.31
Midland	75	— 4	36.9	0.02
McIntosh, Fort	82	19	49.2	0.30
Ringgold, Fort	99	18	52.7	0.34
New Ulm	80	7	43.6	1.13
Vermont.				
Brattleborough	56	—17	20.9	6.47
Burlington	54	—20	18.1	1.68
Charlotte*	48	—20	14.0	2.90
Dorset	54	—23	18.5	2.94
Lunenburg	42	—22	15.0	2.65
Newport*	48	—28	14.8	3.48
Poultney	56	—27	16.7	3.72
Post Mills Village*	47	—30	17.2	.....
Stowe *	50	—24	.....	6.00
Strafford *	46	—26	16.0	4.60
Virginia.				
Accotink	62	— 9	29.7	4.29
Bird's Nest*	57	10	35.4	3.15
Bruington *	.....	6	.....	5.23
Dale Enterprise*	60	—12	28.2	5.96
Marion*	58	—10	25.8	3.58
Monroe, Fort	60	8	34.3	1.92
Snowville*	66	— 6	.....	.....
Summit	60	—12	27.8	.....
University of Va	59	12	31.0	.....
Variety Mills	62	—12	28.7	3.82
Wytheville	59	— 8	29.1	3.88
Washington Territory.				
Bainbridge Island *	54	16	37.0	6.95
Kenowick*	53	—16	.....	2.10
Pleasant Grove*	51	22	.....	2.62
Spokane, Fort	46	—14	19.4	1.32
Tacoma *	51	14	35.0	7.71
Townsend, Fort	52	9	37.7	.....
West Virginia.				
Clarksburg *	62	—10	.....	2.11
Helvetia*	62	—10	29.0	3.45
Parkersburg	60	—12	20.4	7.21?
Wisconsin.				
Embarras *	36	-30	11.6	4.35
Madison	35	—24	11.9	3.33
Manitowoc	41	29	17.2	3.80
Neillsville *	25	—48	—1.9	2.71
Prairie-du-Chien	35	—25	11.5	3.26
Wausau	35	—38	8.9	3.08
Wyoming.				
Bridger, Fort	38	—10	20.4	4.19
Fred Steele, Fort	44	—23	19.0	0.28
Washakie, Fort	56	—37	15.3	0.04
McKinney, Fort	55	—40	13.9	1.00

NOTES AND EXTRACTS.

The following is an extract from the January, 1886, report of the "Alabama Weather Service," under direction of Prof. P. H. Mell, jr., Auburn:

The severe weather of the month has rendered January the most remarkable season recorded in many years. All agricultural interests suffered greatly. The oats that were growing finely at the opening of the month were totally destroyed by the cold wave that began on the 8th. Considerable stock during this period were also killed where proper protection was not given, and even in those cases where special care was shown the cattle much suffering occurred. Ice and frost were frequent, and in many sections large streams were covered with such thick ice as to permit skating. A slight fall of snow was also reported from most stations.

The precipitation was in excess from 0.2 to 2 inches.

The following notes from the observers will be of interest:

Birmingham: "On the 8th the temperature fell 42°.5 in twenty hours, and remained below freezing six days—touching at, or near, zero on four successive mornings. The average for the six days (8–14th) was 14°.5. The ground was frozen to the depth of two feet or more, and ice formed four inches in thickness. Winter cabbage, carrots, turnips, leaves of mock orange, magnolia, and honeysuckle were killed. The damage to the fruit trees, if any, cannot be ascertained until spring. The high wind of the 15th did considerable damage to small buildings, and unroofed one or two large structures. On the 9th and 10th the air was filled with fine snow, which obscured the sun, giving the sky a smoky appearance."

Chattanooga: "The month of January, 1886, is one that will be long remembered by the inhabitants of Chattanooga. The mean annual January temperature is 40°.7, but January, 1886, was 7°.5 below the normal, and 18°.5 below the mean for January, 1880, also 11°.8 below that for the corresponding month in 1882. The minimum temperature, which was 6°.9 below zero on the 11th, is 21°.4 below the average of the last seven years' minimum temperatures, the lowest recorded, in 1880, being 29° above. The state of the weather being clear and cloudy, shows that there were seventeen cloudy days during the month and but fourteen clear to fair. In January, 1880, there were twenty-one clear to fair and but ten cloudy days. Also in 1885 there were twenty clear to fair and only eleven cloudy. The number of cloudy days has been exceeded but once; this was in 1882, when there was a very large amount of precipitation, almost double the usual quantity, the cloudy days numbering 22. The month just closed had 1.08 inches less than the normal amount of precipitation—the total being 6.78 inches. More than half (3.66) of this amount fell on the 2d and 3d. Snow fell on six and rain on fifteen days. There were killing frosts on five days and solar halos on the 17th and 20th. The prevailing direction of the wind was northeast and total movement 4,819 miles."

Gadsden: "On the early morning of the 8th instant the thermometer registered 33°, by 2 p. m. of that day 17°, and early in the evening 10°, making the average for the day 20°. The following morning, the 9th, a little after daylight, it registered 2° below zero, and at 7 a. m. 4° below, where it remained until something after 9 a. m. At 1 p. m. it registered 6° above zero and remained at that until after 4 p. m.; early in the evening it registered 3° above; the average for the day was 2° above. On the morning of the 10th the thermometer registered 3° below zero, by 2 p. m. 14° above, and at night 8°, making the average for the day about 6° above. On the morning of the 11th, at daylight, the thermometer registered 3° below, and at 8 a. m. 7° below zero; it reached 8° above by 2 p. m. and dropped to 2° above at night, making the average for the day 0°. On the morning of the 12th 2° below zero was registered. The average for the four days was 7°.5 above. The average for the night of the 8th was 3° above; that of the 9th, 0°, of the 10th, 0°.5 above. I found the ground frozen twelve inches by measurement, and ice upon a pond, four and one-half inches thick. The coldest day of the winter previous to these was that of December 15, 1885, when the thermometer registered 15° in the morning and 20° at night, the average for the day being 23°. The coldest day of last winter was February 11th, when the thermometer registered 0° in the morning, 22° at noon, and 18° at night. The average for the day being 14°. The average for the four coldest days of last winter was 21°. The average for the coldest night of last winter was 8°.5 above. My thermometer may not register correctly, but the comparisons, at least, are correct. The charts sent me by the Signal Service office show that the cold wave tends very decidedly to deflect upon this portion of the state, caused no doubt by the conformation of the several ranges of mountains near us, so that it is usually colder at Gadsden than at many other places in the same latitude."

Mountain View: "On Friday morning the 8th, about 1 or 2 a. m. it commenced raining. The sky was without a cloud at 11 p. m., Thursday. The wind blew from the south. About 8.30 a. m. Friday the wind suddenly shifted to the west, and it snowed for half an hour, and commenced turning cold. The thermometer at 7 a. m. was 40°; at 2 p. m. it fell to 18°, and 9 p. m. it was 9° above zero. The wind blew very hard all the evening and that night. At 7 a. m. Saturday (9th) the thermometer was —6°. It was very cold all day. On Monday (11th) at 7 a. m. the thermometer registered —4°, and continued cold all day. Everything that contained moisture, and was not protected, was frozen. January has been an exceedingly rough month; a greater extreme than we have ever known in this country."

Prattville: "The cold wave predicted for the 7th reached us at 8.30 a. m. on the 8th, and within twenty-two hours the temperature fell from 46° to 6°. The wind, which was from the west, was often severe. Clouds shut out the sun, and fine snow driven by the wind added much to the rigor of the blast. Cattle, well fed, wrapped in bagging, and stalled, suffered very much. The leaves of bay trees, and green logs in the wood-yard eight inches thick had frozen water in their centres. Just before the cold wave came a dense mist from the southwest filled the atmosphere. Shortly after this wind began to rise and soon blew with considerable violence. The immense pond connected with the factories was covered with ice on the 13th one hundred yards from the shore and five inches thick. No one remembers to have seen this condition of the pond before.

Tuscumbia: "On the 8th throughout the entire day it was raining, snowing, and hailing. The 9th was very cold, registering —4°. Ice formed five inches in thickness. The 10th, 11th, and 12th were bitter cold days. Everything frozen."

State summary.

Mean temperature, 37°.9; highest temperature, 68°, at Mobile, on the 21st; lowest temperature, 7° below zero, at Gadsden and Chattanooga, on the 11th; range of temperature, 75°; greatest monthly range of temperature, 69°, at Mount View; least monthly range of temperature, 56°, at Eufaula; mean daily range of temperature, 12.6°; greatest daily range of temperature, 40°, at Tuscaloosa, on the 8th; least daily range of temperature, 0°, at Centre, on the 3d; Fayette, on the 24th; and at Oswichee, on 5th.

Mean depth of rainfall, 6.63 inches; mean daily rainfall, 0.214 inch; greatest depth of monthly rainfall, 11.00 inches, at Newton; least depth of monthly rainfall, 3.17 inches, at Jacksonville; greatest daily rainfall average for state, 2.16 inches, on the 3d; greatest daily local rainfall, 4.57 inches, at Greensborough, on the 3d.

Average number of days on which rain fell, 7; average number of cloudy days, 17; average number of fair days, 6; average number of clear days, 8; warmest days, 1st, 2d, and 3d; coldest days, 8th, 9th, 10th 11th, 12th.

Prevailing direction of wind, northwest.

The following is an extract from the January, 1886, "Weather Review of the Illinois Weather Service," under direction of

Mr. Charles F. Mills, of the Illinois Department of Agriculture, Springfield:

This "Review" contains a general summary of the conditions which prevailed over Illinois during the month of January, 1886, based upon the reports received from the Signal Service and voluntary observers reporting to the Illinois Department of Agriculture.

The state covers such an extended area from north to south (385 miles) that it has been found advisable to divide the same and follow the judicial divisions, which include the following territory, viz., the northern division extends from 42° 30′ to about 40° 31′; the central division extends from about 40° 31′ to about 39°; the southern division from about 39° to 36° 51′.

Atmospheric pressure.—The highest barometer reported at fourteen stations during the month of January was on the 11th, at six stations; on the 23d, at five stations; and on the 10th, 15th, and 19th, at one station each. The lowest barometer reported at fourteen stations during January, was on the 3d, at ten stations; on the 4th, at three stations; and on the 27th, at one station. The highest barometer reported in January during the past five years has been as follows: 1882, 30.780; 1883, 30.799; 1884, 30.850; 1885, 30.912; 1886, 30.700. The lowest barometer in January for the years named, was as follows: 1882, 28.930; 1883, 29,800; 1884, 29.070; 1885, 29.870; 1886, 29.000. The mean barometer of January for the same period was as follows: 1882, 30.074; 1883, 30.031; 1884, 30.133; 1885, 30.166; 1886, 30.009.

Temperature.—The mean temperature of January, 1886, was lower than the average of the corresponding month at all except four of the stations in the state from which observations have been received for a term of years. The mean temperature for the month was higher than the January average as noted at the following stations: At Aurora, Kane county, the average temperature for January, 1886, was 2°.43 higher than the average of the month in previous years; Prairieville, Lee county, 0°.60; Pana, Christian county, 0°.08; Centralia, Marion county, 0°.66. The temperature was below the January mean as noted at the following stations: At Marengo, McHenry county, the temperature for January, 1886, was 4°.90 below the mean of the corresponding month in previous years; Sycamore, DeKalb county, 0°.09; Chicago, Cook county, 2°.65; Davenport, Iowa, 6°.19; Peoria, 4°.33; Keokuk, Iowa, 9°.39; Springfield, 1°.87; Griggsville, Pike county, 1°.22; Mattoon, Coles county, 1°.25; Palestine, Crawford county, 0°.83; Greenville, Bond county, 0°.70; Saint Louis, Missouri, 5°.67; Swanwick, Perry county, 0°.81; McLeansborough, Hamilton county, 0°.70; Anna, Union county, 8°.14; Golconda, Pope county, 5°.51; Cairo, Alexander county, 9°.02. The average mean temperature of January for a term of twelve years has been 23°.35, which is 4°.87 higher than the mean for January, 1886. The mean temperature of January, 1876, 1877, 1878, 1879, 1880, 1882, and 1885 was higher than that of 1886, and lower in January, 1875, 1881, 1883, and 1884 than during the past month. The highest mean temperature for January during the past twelve years was 40°.84, in 1880, and the lowest mean of the month for the same period, 15°.45, in 1875.

The mean temperature of January during the past twelve years was: 1875, 15°.45; 1876, 33°.37; 1877, 21°.45; 1878, 29°.75; 1879, 21°.89; 1880, 40°.84; 1881, 15°.94; 1882, 28°.38; 1883, 17°.61; 1884, 18°.42; 1885, 18°.62; 1886, 18°.48; average for twelve years, 23°.35.

The highest temperature in January, 1886, was reported on the 3d at twenty-nine stations; on the 10th at ten stations; on the 2d at nine stations, and on the 5th at one station; in the northern division of the state the highest temperature was reported on the 3d at ten stations; on the 2d at five stations, and on the 1st at one station. In the central division of the state the highest temperature during the month was reported on the 3d at nine stations; on the 1st at four stations; on the 2d at two stations, and on the 5th at one station. In the southern division of the state the highest temperature in January was reported on the 3d at ten stations; on the 1st at five stations, and on the 2d at two stations; the lowest temperature in January, 1886, was reported on the 9th at fifteen stations, on the 10th at fourteen stations, on the 11th at nine stations, on the 23d at eight stations, and on the 12th and 22d at one station each; in the northern division of the state, the lowest temperature was reported on the 23d at eight stations, on the 10th at six stations and on the 22d at one station; in the central division of the state, the lowest temperature was reported at seven stations on the 9th, and same number stations on the 10th and on the 11th and 12th at one station each; in the southern division of the state, the lowest temperature was reported on the 9th at eight stations, on the 11th at eight stations, and on the 10th at one station; the highest temperature noted in January, 1886, was 61°.00, at Eberle, Effingham county, and the lowest, —26°.00, on the 23d, at Marengo, McHenry county; the highest temperature noted in January for a term of years has been as follows: 1882, 68°.00; 1883, 56°.00; 1884, 80°.00; 1885, 64°.00; and 1886, 61°.00. The lowest temperature noted for the same months during the years named was as follows: 1882, —12°.00; 1883, —34°.00; 1884, —33°.00; 1885, —32°.00; and 1886, —26°.00. The mean temperature of the state for the month of January during the past five years has been as follows: 1882, 28°.97; 1883, 17°.60; 1884, 18°.42; 1885, 18°.31; 1886, 18°.48.

Precipitation.—The precipitation in January, 1886, including melted snow, averaged 3.04 inches at the forty-two stations represented in this report, and exceeds the average rainfall for January during the past twelve years by 0.75 of an inch. The average rainfall of January, 1886, was exceeded by the precipitation of the corresponding month in 1876 of 5.17 inches, and in 1880, of 3.86 inches. The rainfall was quite general over the state on the 2d, 3d, 4th, 8th, 15th, 18th, 20th, 27th, and 30th of January. There was no rain reported in any portion of the state January 11th and 24th. The average precipitation at the stations from which reports were received for January was less than the average for the month at seven stations and greater at seventeen stations. No comparison is made for the remaining nineteen stations established during the year. The precipitation in January, 1886, was less than the average rainfall for the same month in previous years as noted at the following stations, viz., Davenport, Iowa, 0.48 of an inch less; Peoria, 0.78; Pana, Christian county, 0.46; Greenville, Bond county, 0.31; Anna, Union county, 0.50; Golconda, Pope county, 0.58; Cairo, 0.34. The January, 1886, precipitation exceeded the average of the month as noted at the following stations, viz., Marengo, McHenry county, 1.78 inches more than the average; Sycamore, DeKalb county, 1.82; Chicago, 1.53; Aurora, Kane county, 1.14; Prairieville, Lee county, 1.89; Keokuk, Iowa, 0.44; Springfield, 0.12; Griggsville, Pike county, 0.54; Mattoon, Coles county, 0.97; Palestine, Crawford county, 0.35; Collinsville, Madison county, 1.32; Centralia, Marion county, 1.90; Saint Louis, Missouri, 0.89; Mascoutah, Saint Clair county, 1.29; Swanwick, Perry county, 0.68; McLeansborough, Hamilton county, 0.51. The least precipitation at any station in January, 1886, was 1.68 inches at Pana, Christian county. The greatest rainfall during the month was 5.01 inches at Sumner, Lawrence county.

The average monthly precipitation for all the stations from which January observations have been received during the past twelve years was: 1875, 1.14; 1876, 5.17; 1877, 1.42; 1878, 1.46; 1879, 1.61; 1880, 3.86; 1881, 1.49; 1882, 2.41; 1883, 1.87; 1884, 1.21; 1885, 2.84; 1886, 3.04; average for the twelve years, 2.29.

Remarks.—The science of meteorology is deservedly receiving more attention each succeeding year, especially at the hands of the more intelligent farmers who realize the great practical value of information of this character to all engaged in agricultural pursuits.

The department desires to secure the assistance of an observer for each county in the state. There are, doubtless, parties in the counties not represented in this report by observers, who are giving attention to the science of meteorology. The attention of all interested in having the meteorological history of each county in the state preserved in the "Monthly Weather Review" of the department is invited to the importance of this work and an earnest invitation is extended to all to aid in completing the meteorological records of the state.

The following meteorological summary and accompanying remarks are from the January, 1886, report of the "Indiana Weather Service," under direction of Prof. W. H. Ragan, of De Pauw University, Greencastle:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly means.	
	°	°	°	*Inches.*
Northern counties	56.0	—20.0	19.9	2.68
Central counties	55.0	—24.0	21.6	3.49
Southern counties	60.0	—25.0	24.4	3.91
State	60.0	—25.0	22.0	3.36

The cold wave of the 9–13th in some particulars was the most remarkable known for years. This was true as regards its widespread distribution in the southern portions of the United States. The weather records of Florida show that they have had no such unusually low temperature since 1835. The zero line dropped down into Texas, and extended through the cotton states to Georgia, while the frost line extended far into the Gulf of Mexico, including all of Florida. The wave passed down from Manitoba, over the western plains to Texas and Louisiana, gradually diminishing in severity as it spread eastward. It did not strike us with the sudden violence of that of January 1, 1864, nor did the temperature fall so low as on January 5, 1884, but, like each of those noted storms, was borne to us by west or southwest winds. This storm is therefore noted, not so much for its intense severity in Indiana as for its having penetrated the extreme south, as it did. By reference to the Signal Service daily weather maps for the period covered by this storm, we are led to the conclusion that such phenomena are due to the location, energy, and movement of an area of high barometer and cold wave in the Northwest and a low barometer that precedes the cold wave, coincident in time as to formation and movement. If the low is located well south, as was true of the depression that preceded this cold wave, and if it possesses unusual energy, it is quite probable that we will have a widespread distribution of the storm, or, at least, that the cold wave will penetrate as far south as the line of movement eastward of the centre of the low barometer. On the other hand, if the low pressure area is high up, say crossing through Indiana or northward, while it may be intensely cold in Minnesota and Dakota, it will, most probably, not extend to the Gulf States. An illustration of this may be found in the succeeding cold wave of the 21st–23d, when the temperature at Saint Paul was really lower than during the storm under consideration, yet it did not fall below 50° in Florida.

Temperature.—The average of the 1st, 2d, 3d, 15th, 25th, 26th, 27th was above freezing, and of the 9th, 10th, 11th below zero at Indianapolis. The 3d was the warmest and the 10th the coldest. The 10th was a little colder than the coldest day of last winter (—10°.9, mean; —4°.9, highest; —15°.2, lowest; against —10°.8; +6°.6; —13°.1, February 10th) at Greencastle. The average for the month was 3°.1 below the normal at Logansport; 3°.7 below at Spiceland; 6°.4 below at Indianapolis; 2°.1 above at Connersville; 1°.8

below at Mauzy; 1°.1 above at Sunman; 0°.3 above at Columbus; 0°.3 above at Worthington; 4°.1 below at Vevay; 3°.3 below at Blue Lick; 0°.9 above at Degonia Springs; and for the state, 1°.1 lower than in 1883; 1°.9 higher than in 1884; 1°.7 higher than in 1885; 0°.6 above normal. The highest station mean was 27°.3, at Vevay; lowest, 16°.4, at Monticello; highest maximum, 60°, at Butlerville and Vevay; lowest minimum (singularly enough), —25°, at Butlerville; state range, 85°; average station range, 72°.0; greatest, 85°; least, 67°. The highest occurred at all stations on the 3d, and the lowest at all central and southern stations on the 10th, 11th, 12th, and at some northern stations on the 23d. It is probable the air was coldest on the 10th in that group of cold days, and the lower temperatures of the 11th and 12th were recorded from thermometers exposed to uninterrupted radiation in calmer, clear weather. In the north the lowest temperatures were probably not reached during the first severe cold wave because of the proximity of the lakes.

Temperature of well water on the 31st, with depth of water in feet—Greencastle 46°, 13; Connersville, 39°, 6; Salem, 49°, 14; Princeton, 49°, 14.

Precipitation (inches).—The precipitation was well distributed through the month and over the state, ranging from 28.78, on the 15th, to none, on the 6th, 7th, 14th, 17th, 24th, 26th, and from 5.71, at Marengo, to 1.33, at Monticello. The snowfall ranged from 18.6, at North Liberty, to 4.1, at Blue Lick, quite a number of stations not reporting. Principal rains fell on the 2d (17.49), 3d (10.68), 15th (28.78), 20th (8.12), 27th (6.30), and snows on the 4th, 5th, 8th, 9th, 16th, 18th, 29th, 30th, 31st. The principal rains all fell in connection with pronounced low barometric areas. Precipitation fell on twenty-five days in some portion of the state. Snow fell on sixteen days in the north, twenty in centre, sixteen in south, twenty-one in the state. Thunder-storm at Marengo, on the 2d. Total precipitation was 0.29 above normal at Logansport; 0.85 above at Spiceland; 1.01 above at Indianapolis; 0.39 above at Connersville; 1.09 above at Mauzy; 0.46 above at Sunman; 0.58 above at Columbus; 1.73 below at Worthington; 0.48 below at Vevay; 0.22 below at Blue Lick; for the state, precipitation 0.99 above 1883; 1.67 above 1884; 0.32 below 1885; 0.59 above normal; snowfall 3.8 below 1884; 3.7 below 1885; 2.5 below normal.

Year, January—warmest, coldest; greatest precipitation, least; greatest snowfall, least.—Logansport (43.°0), 1880, (10°.5), 1875; (4.70), 1870, (0.24), 1857; (35°.4), 1873, (0°.2), 1876; Spiceland, 1880, 1857; 1876, 1884; 1867, 1876; Indianapolis (45°.9) 1880, (20°.0) 1875; (6.32) 1880, (1.01) 1875; —, —; Vevay, 1880, 1884; 1876, 1879; 1865, 1876. This January has exhibited no extreme in any element in this state. The most remarkable general feature is set forth in the opening. The cloudiness and number of days on which there was precipitation were probably very greatly in excess of normal.

The following meteorological summary and accompanying remarks are from the January, 1886, report of the "Indiana Weather Service," under direction of Prof. H. A. Huston, of Purdue University, Lafayette:

Districts.	Temperature.			Average precipitation.
	Highest.	Lowest.	Monthly mean.	
	°	°	°	*Inches.*
Northern counties	56.0	—18.0	19.39	2.58
Central counties	55.0	—24.0	21.81	3.47
Southern counties	60.0	—23.0	24.52	3.57
State	60.0	—24.0	21.91	3.21

The mean temperature of the state for January, 1886, was 0°.9 above that for the past three Januarys; 6°.64 below the mean of fifteen years at Indianapolis; 4°.33 below the mean of thirty-one years at Logansport; 9°.49 below the mean of twenty-one years at Vevay; 3°.68 below the mean of thirty-two years at Spiceland; 0°.91 above the mean of six years at Mauzy; 6°.24 below the mean of eight years at Blue Lick; 0°.65 below the mean of four years at Worthington; and 1°.28 below the mean of seven years at this station. The mean temperatures at the various stations were, with one exception, below the normal, the amounts ranging from 1°.8 to 6°.4. The highest temperatures were reported on the 3d; the lowest from the 10th to the 12th. The cold wave of this period was general throughout the state, while that of the 23d was much more marked in the northern counties.

The mean precipitation for the state was 0.26 inch above that for the past three Januarys; 0.3 inch above the mean of fifteen years at Indianapolis; 1.17 inches above the mean of twenty-six years at Logansport; 0.89 inch above the mean of twenty-one years at Vevay; 0.32 inch above the mean of twenty-six years at Spiceland; 0.03 inch above the mean of six years at Mauzy; 0.12 inch below the mean of five years at Blue Lick; 0.77 inch above the mean of four years at Worthington; and 0.82 inch above the mean of seven years at this station. At southern stations the precipitation was below the normal, at central and northern stations it was above the normal. The snowfall was normal.

Eight stations reported lunar halos on the 14th and one on the 16th, 17th, and 18th. Four solar halos and one solar corona were reported.

The following is an extract from the January, 1886, report of the "Minnesota Weather Service," under direction of Prof. Wm. W. Payne, Carleton College, Northfield:

The average mean temperature for January, in direct contrast with the preceding month, and as during the three preceding Januarys of 1885, 1883, and 1882, has been much below the average temperature throughout the state. The warmest part of the state has been in the vicinity of Lake Superior and the lower altitudes in the vicinity of the Mississippi River, where the average has been from 2° to 12° above zero; in all other sections the mean varied from —0°.1 to —11°.2, the average for the state being 0°.9 above zero. At many stations the highest temperatures for the month were below the freezing point. The maximum temperature, 38°.0, was noted at Grand Forks, on the 13th, and the minimum temperature, —41°.5, at Park Rapids, on the 23d.

The warmer periods lasted from the 1st to the 6th and from the 24th to the 31st. There were also two well-defined cold periods, the first lasting from the 7th to the 12th, and the second from the 17th to the 24th. The 8th, 9th, and 10th, and 16th, 20th, and 22d were severely cold days, the average being many degrees below zero. The large monthly movement of 12,800 miles of wind occurred at Bird Island. Gales were frequent, and sometimes severe, in the western part of the state. The average direction of the wind was, as usual for a winter month, from the northwest.

Precipitation.—The precipitation during the month has been nearly all in the form of snow, and in very variable quantities in the several sections of the state. In the southeastern part, south of a line drawn from Saint Paul to Sherburne, there has been from two to five times the average amount. In the central-western part from one-half to two-thirds less than usual, and in the north and northwest about the usual amount. At Winona there were nineteen, Red Wing sixteen, Northfield sixteen, Mankato fourteen, and Albert Lea twelve days on which snow fell in measurable quantities. Large amounts, in inches, for the month were noted as follows: Duluth, 22; Red Wing, 52; Northfield, 38.8; Winona, 56.0; Mankato, 35.4; and Spring Valley, 44 inches. The greater amount of this snow was precipitated on the 2d, 3d, and 4th, during which time the southeastern part of the state was within the influence of a vapor-laden cyclone, which advanced from southern Texas and the Gulf of Mexico during the 1st and 2d, and was central at La Crosse at 7 a. m. of the 3d, causing brisk gales and heavy snow for three days which, however, did not extend west of Saint Cloud and Bird Island. At the end of the month there were from two to five inches of snow on the ground in the central-western part of the state, and from ten to twenty inches in the northern and northwestern sections. The deep snow, by drifting and filling the cuts, has, at times, seriously interfered with traffic on the railways south of Saint Paul, but north and west of that point has not been in sufficient quantities to more than slightly delay the movement of trains. The ground in the logging districts, which was nearly or quite bare at the beginning of the month, is now covered with from one to two feet of snow, and prospects are good for a full average cut of logs for the next season's supply.

Grand Forks: 1st, two very bright parhelia visible from 2 p. m. until sunset; clear sky and light haze. 2d, 9 p. m., a faint light in the north, a few auroral beams visible at 9.35 p. m. of a pale whitish color; altitude, 20°; azimuth. 10; visible about five minutes. 4th, 11.30 a. m., two parhelia, obscured by a thick, whitish haze, were visible at intervals until after 3 p. m. 6th, 2 p. m., cold northwest blizzard and continued until 5 p. m. of 8th; maximum velocity of wind, twenty-eight miles; trains from south two to three hours late. 9th, 9.30 p. m., auroral display, consisting of two bright arches with a dark cloud beneath; arches crossed the heavens from northwest to southeast, and remaining stationary; altitudes about 25° and 30°; at 10 p. m. a few streamers shot upwards of the arches, being of a few minutes' duration; the display continued until after midnight. 11th, a brilliant sunset display, the sky remaining very red long after sundown. 13th, sky very red before sunrise, and the sun a very bright white color. 15th, 10.32 a. m., two parhelia visible, nearly obscured by a thick haze. 16th, 6.35 p. m., a large lunar halo, visible until 9.50 p. m.; 16th, 9.30 a. m., two parhelia visible, nearly obscured by a haze. 18th, 3.20 p. m., two parhelia of bright white and red tint; cloudy; 18th, 6.15 p. m., two paraclenes slightly obscured by a haze and visible until 7.20 p. m.; at 8.00 p. m. two large lunar halos. 19th, 9.40 p. m., a large lunar halo visible; was obscured by a haze at 9.45 p. m. 20th, 9.20 a. m., two parhelia visible, light haze, .5 cloudy. 21st, a cold north blizzard from 9 a m. until 10 p. m.; maximum velocity, twenty-eight miles; 8.30 p. m., a large lunar halo, being visible but a few seconds, completely obscured by a thick haze. 22d, 2.20 p. m., two parhelia visible; color, bright white and pink tint; clear sky. 27th, a brilliant sunrise display and sky remarkably red; at 2 p. m., a gale from the south; maximum velocity at 9 p. m., thirty-three miles; a blizzard from northwest raging all night, and continued until 4 p. m. of 28th; maximum velocity, twenty-eight miles.

Sherburne, 2d, 7 a. m., snowfall in night about three-fourths inch; 2 p. m., a thick haze around the sun; 6 p. m., commenced to snow; 9 p. m., still snowing, with heavy north wind. 3d, 7 a. m., snow storm; 2 p. m., wind blowing a gale and snow storm; 9 p. m., heavy wind and snow storm. 4th, 7 a. m., high wind and snow storm. 10th, 9 p. m., two bright lunar parhelias north and south of moon; high wind. 14th, 6 p. m., commenced to snow; 9 p. m., snowing very little. 15th, snow storm in the night; 7 a. m., snowing very little; snowfall between two and three inches; 2 p. m., stormy. 21st, a deep red sunrise; 10.30 a. m., wind blowing a gale; 2 p. m., snow flying; wind blowing a gale. 25th, a sleet storm in night; 4.30 p. m., a thick haze around the sun. 30th, snow storm in night about one-half inch deep; 10 a m., snow storm; 2 p. m., snowing a very little. 31st, 8.30 a. m., snow storm.

Morris: 17th, halo 20° in diameter, east edge passing through the moon.

Wadena: 21st, six inches of snow on the ground and sleighing good; weather clear and pleasant during month, with few stormy days; snow drifted but slightly.

Red Wing: the heaviest snow storm ever known in Red Wing began at 6.30 p. m. of the 2d, and continued until 4 p. m. of the 4th. Total snowfall 30 inches.

Spring Valley: 9th, a very fine meteor passed over the village from west to east, for a moment bright as the sun at noonday.

Albert Lea: coldest day, Friday, 22d; average, —27°.8. Ice in lakes twenty-four inches thick. Amount of snowfall largest known in any one month in many years.

The following is an extract from the January, 1886, report of the "Missouri Weather Service," under direction of Prof. Francis E. Nipher, Washington University, Saint Louis:

The month of January, 1886, has been uniformly cold, with a marked excess of precipitation, almost all of which has fallen as snow. The average temperature was 22°.1 at the central station, which has been exceeded in coldness but three times since 1837; this was in the years 1856, 1857, and 1875, the coldest having been 19°.3, in 1857.

The last four Januarys have been unusually cold. Their means have been 24°.6, 22°.8, 22°.5, and 22°.1, each one being thus colder than the preceding one. The normal January temperature is 31°.8. The coldest minimum temperature reached during the month was —14°.2, on the 9th. The highest maximum was 57°, on the 2d. A marked feature of the month was the high winds which accompanied the coldest weather. The temperature fell below zero Fahr. on twenty-eight days, or on every day after the 3d. On one day it did not rise above zero, —2° being the maximum, and on sixteen days it did not rise above 32° Fahr. The precipitation was quite uniformly distributed throughout the month. During the last half of the month the ground was entirely covered with snow, with little or no thawing during the day.

In the state the lowest minimum temperature reported was —24°, at Oregon; Kirksville and Sedalia reporting —22°. The highest minimum was reported from the signal office at Cairo, Illinois. viz., —9°. The minimum reported by the signal office at Saint Louis, —8°.2, is evidently affected by local influences.

The rainfall (melted snow) in the state has been from one to two inches in the extreme north, and also south of a line drawn diagonally across the state from northwest to southeast, a belt of this area extending into Illinois in the vicinity of Saint Genevieve. The maximum fall, 3.5 inches, occurred at Saint Charles and Saint Louis.

Chamois reports the coldest January for thirteen years, and that the temperature was 7° below the average January of that period. The rainfall was three inches, most of which is yet on the ground as snow and ice.

Houstonia reports parhelia on the 11th and 16th, solar halo of 22° with upper contact arch, on the 8th, while on the 9th halos of 22° and 46° with upper contact arches were visible. Four inches of snow on the ground at the end of the month.

Houstonia also reports the temperature of the McAlister Springs as follows: Salt Gum, 60°; Black Sulphur, 59°; White Sulphur, 52°.5. The external temperature was 38°.

Glasgow reports solar halos on the 7th, 8th, and 22d.

Mexico reports eight inches of snow on the ground at the close of the month, and Ironton reports eight and one-half inches.

At Oregon the total snowfall of the month was 21.3 inches, ten inches being on the ground at the end of the month. A good winter for wheat. Rainfall and snow exceeds that of any January since 1861, and any preceding that since 1855.

The following is an extract from the January, 1886, report of the "Nebraska Weather Service," under direction of Prof. Goodwin D. Swezey, of Doane College, Crete:

The month opened with a storm of considerable energy in Texas, which moved in a northeasterly direction, accompanied by heavy snow in this region. This storm was very widespread and disappeared in the Saint Lawrence Valley on the 4th.

The severest storm of the month developed in western Kansas during the afternoon of the 6th. At the time of its formation a cold wave made its appearance north of Montana. The storm at first was a weak depression, and was pressed southward by the area of high pressure till it reached the Texas coast on the 7th. Cold-wave flags were ordered up in eastern Nebraska on the afternoon of the 6th; this was a genuine "norther," wind blowing that night from the north-northwest at from forty to fifty miles an hour at Crete; the temperature fell thirty-nine degrees in twenty-four hours. The cold wave moved with great rapidity southward, causing a severe "norther" in Texas, with intense cold weather, which was destructive to animal life and the sugar-cane in the sugar-growing regions of Texas and Louisiana. The storm, continuing its northeasterly movement, was central over the Chesapeake Bay at midnight of the 8th, and was last observed on the 10th over the the Gulf of Saint Lawrence. The lowest temperature of the month was on the 8th, during the passage of the cold wave.

On the 14th another storm made its appearance in Texas, moved northeastwardly to the Lake region, and was followed by a cold wave, for which flags were ordered up here, and which were justified by a fall of twenty-two degrees. The next considerable storm was on the 18th; it was also followed by a cold wave. On the 22d a cold wave made its appearance in the Northwest and gradually overspread all districts; and a fourth cold wave, with a fall of thirty-one degrees, came on the last day of the month.

On the whole, the month has been a marked month, with the most continued cold weather for many years; the cold has not been extreme, the minimum for the month not being as low as for the past three Januarys, but the mean temperature for the month has been far lower than ever before since our observations began. In the middle and western sections of the state the temperature has been considerably higher and on the Pacific coast it was about as high as usual. The month has also been most remarkable in the amount of snow, being nearly double that of any preceding January and nearly four times the normal amount for January. The number of days of snowfall and the number of cloudy days have been correspondingly large.

Precipitation.—The average rain for the different sections of the state for January, 1886, is as follows:

	Inches.
Northeast section (one station)	0.44
North middle (no station)	
West (one station)	0.55
South middle (two stations)	0.70
Southeast (covering essentially what has heretofore been the "whole state") as far as reporting	2.04
State average by sections	0.93

Weather signals.—The weather indications for eastern Nebraska, as forecast by the Signal Service at Washington, are now telegraphed daily to the central office at Crete, and signals are displayed from the college building to indicate the weather of the next twenty-fours. Towns, or private parties in towns, who will pay for the telegrams may have cold wave and other warnings sent them from this office, and may be able to confer substantial benefits upon the community by displaying signals.

The following is an extract from the January, 1886, "Bulletin of the New England Meteorological Society," under direction of Prof. Winslow Upton, Providence, Rhode Island:

Summary for January, 1886.

Reports for the month were received from one hundred and thirty-three observers.

General Conditions.—The meteorological conditions of the month may be briefly enumerated in eight divisions: first, 1st–3d; fair and warm, the barometric depression of December 31st having been succeeded by an area of high pressure. Second, 4–6th; cloudy and warm, with heavy rains attending a depression which passed easterly on the 5th over lower Canada. Third, 7–8th; succeeding cold wave, but pressure still below the normal. Fourth, 9–10th; violent and destructive snow storm, adepr ession (pressure 28.7) passing from Rhode Island northerly across eastern Massachusetts and western Maine. Fifth, 11–16th; succeeding cold wave with very high pressure (30.8). Sixth, 17th–22d; cloudy, with snow and rain, and short intervals of clear weather attending three depressions which moved easterly in lower Canada on the 17th, 19th, and 21st, respectively. Seventh, 23d; succeeding cold wave and high pressure (30.6). Eighth, 24th–31st; a week of cloudy weather, with temperature near freezing, frequent snow, rain, and sleet, a barometric depression prevailing in the Southern States on the first three days, and later advancing northeasterly in the Atlantic Ocean. The general character of the month was therefore stormy, with a large amount of rain and snow, several severe cold waves, great ranges of barometric pressure, and six cyclonic depressions, one of which passed directly over the district.

Special Features.—The following deserve prominent mention:

1. *The heavy rains of the 3d–5th*: The amounts reported average between one and two inches, 2.50 inches having been recorded in Connecticut. The high temperature added to the rainfall caused the ice to break up in the rivers, and very disastrous freshets occurred, especially in Maine, New Hampshire, and Connecticut.

2. *The storm of the 9th and 10th*: This is one of the most severe on record. Entering the Gulf States on the 7th (pressure 29.5) it moved northeasterly with a velocity of about thirty-five miles per hour, increasing in intensity as it advanced. Its centre (pressure 28.7) passed nearly over Providence, Boston, and Portland on the 9th. The barometric gradient, 30.8 in the northwest to 28.7 at the storm-centre, caused winds reaching sixty miles an hour. The temperature was far below the normal, and the snowfall varied from 2.5 to 18 inches, the latter recorded at Beverly. The snow, though light, was densely packed as it was drifted by the wind, and the average of sections taken at seventeen stations shows that one inch of snow was the equivalent of about 0.15 inch of rain.

The barometric registers at Blue Hill and Providence show great oscillations in pressure during its fall, at least three waves of depression having been noted in twelve hours; and the thermometric registers at Providence and Chestnut Hill show a fall of temperature of 15° in the two hours immediately preceding the passage of the centre and a similar rise after its passage. The peculiar characteristics of the storm were the extreme rapidity of the fall in pressure, coupled with its low value at the minimum, which has been surpassed in but few instances on record, and the sudden increase in the violence of the wind from a light wind to a severe gale. The record of disaster to shipping is a long one.

3. *Cold waves and high pressure:* There were three periods of excessive cold, on the 8th and 9th, 12th and 13th, and 23d and 24th, respectively. The second of these was the most severe; at the time of the storm of the 9th, temperatures of —50° prevailed in the extreme northwest. The cold area reached New England on the 12th, the temperatures ranging from —30° to —40° in exposed regions. The barometric pressure exceeded 30.8 inches, the highest reported having been 30.90, at Albany.

4. *The ice storm of the 28th and 29th*: The prevalence of snow, rain, and sleet, beginning on the 24th, culminated in a fall of rain and sleet on the

above dates, which adhered to trees, telegraph wires, and other objects, forming an ice coating from one-half to one and one-half inches thick. This was especially severe along the coast, and great damage was done to trees by the breaking of limbs.

Earthquakes.—A light earthquake was felt on the 5th instant, about 7.10 p. m., over a small area about Merrimac, between Manchester and Nashua, New Hampshire.

A second light earthquake was felt in southern New Hampshire and the adjacent part of Massachusetts about 5.15 p. m., Sunday afternoon, 17th instant; where most distinct, it set furniture and dishes rattling and was accompanied by a noise described by many persons as resembling that made by a wagon on frozen ground. Its area as determined by about sixty reports, of which thirty-six were furnished by Mr. C. H. Webster, of Nashua, New Hampshire, is bounded, approximately, by Haverhill, Lowell, and Fitchburg, Massachusetts, on the south; and by Candia, Manchester, Contoocook, and Warner, New Hampshire, on the north. The disturbance was therefore felt over a surface of about fifteen hundred square miles.

Miscellaneous.—Auroras were reported on the 1st and 8th at Kent's Hill and Mount Washington; 2d, at Walpole and Chelsea; 14th, at Cambridge.

Thunder was noted at Provincetown on the 5th, 7.00–7.30 a. m.

Solar halos of unusual brilliancy were recorded by many observers on the 24th.

The snow on the ground at the close of the month was 6 to 20 inches in depth.

The verification of the daily weather indications displayed by local flag signals, made at eleven stations, gives an average percentage of 86 for temperature and 80 for weather.

Prof. B. F. Thomas, of the Ohio State University, Columbus, director of the "Ohio Meteorological Bureau," forwards the following state summary and table of comparisons for January, 1883 to 1886, in advance of the regular monthly report:

	1883.	Date.	1884.	Date.	1885.	Date.	1886.	Date.	Average for past 4 years.
Mean barometer, inches	30.18	...	30.20	...	30.16	..	30.08	.....	30.16
Highest barometer, inches	30.74	22	30.83	26	30.78	2	30.77	14	30.83
Lowest barometer, inches	29.50	20	29.45	2	29.12	6	29.11	9	29.11
Range of barometer, inches	1.24	...	1.38	...	1.66	...	1.66	.....	1.72
Mean relative humidity	81.6	...	82.6	...	82.0	...	83.8	.....	82.5
Mean temperature	24.1	...	19.4	....	22.6	...	23.9	.....	22.5
Highest temperature	61.0	30	59.7	30	76.0	9	61.0	3	70.0
Lowest temperature	—17.5	22	—34.0	25	—31.0	29	—19.0	12	—34.0
Range of temperature	78.5	...	93.7	...	107.0	...	80.0	.....	110.0
Mean daily range of temperature	16.7	...	18.9	...	18.1	...	16.0	.....	17.4
Greatest daily range of temperature	45.8	21	48.0	25	58.5	30	*k*44.5	14	58.5
Least daily range of temperature	1.8	28	2.1	1	1.2	7	*k*2.0	26, 28	1.2
Average number clear days	3.7	...	6.4	...	8	...	3.3	.....	5.3
Average number fair days	10.3	...	8.2	...	11	...	8.5	.....	9.5
Average number cloudy days	17.0	...	16.4	...	12	...	19.2	.....	16.2
Number days on which rain fell	15.6	...	14	...	13.9	...	16.1	.....	14 9
Mean rainfall, inches	2.45	..	2.72	...	4.16	...	3.49	....	3.21
Average daily rainfall, inches	0.08	...	0.09	...	0.13	...	0.11	.....	0.10
Greatest rainfall, inches	*a*4.04	...	*c*5.61	...	*e*6.73	...	*g*5.72	.....	*e*6.73
Least rainfall, inches	*b*0.75	...	*d*1.55	...	*f* 1.42	...	*h*1.76	.....	*b*0.75
Prevailing direction of wind	sw.	...	sw.	...	sw.	...	w.	.....	sw.

a At Quaker City; *b* at Sidney; *c* at Marietta; *d* at Cleveland; *e* at Pomeroy; *f* at Oberlin; *g* at Granville; *h* at Troy; *i* at New Bremen; *j* at Hanging Rock; *k* at Logan.

Table of verification of weather signals.

Name of station.	Temperature.	State of weather.
	Per cent.	*Per cent.*
McConnelsville	86	97
Hillsborough	93	89
Athens	92	80
Wauseon	94	90
Hamilton	76	86
For all stations	89	89

The following is an extract from the Tennessee "State Board of Health Bulletin," for January, 1886, prepared under direction of J. D. Plunkett, M. D., President of the State Board of Health. The summary is prepared by Major H. C. Bate, in charge of the State Meteorological Service:

The month of January was characterized by the abnormally low temperature about the 9–12th, with the attendant snowfall and high winds, and the large proportion of cloudiness.

The mean temperature was 30°.47, 3°.11 below the mean for January, 1885, and 1°.02 above that for January, 1884. The maximum temperature was 61°, recorded about the 26th, and was 8° below the maximum of January, 1885, and 13° below the maximum of January, 1884. The minimum temperature, recorded about the 11th, was 23° below zero, reported at Sunbright, Morgan county, 18° below the minimum recorded in January, 1885, and 7° below that recorded in January, 1884; this was the lowest point reached in the state for a great many years.

The mean precipitation for the month was 5.06 inches, 1.90 inches less than the precipitation for the corresponding period last year, and 1.49 inches less than that for the corresponding period of 1884. Of this amount, the eastern division received an average of over five inches, the middle division received an average of a little less than five inches, while the western division received over 5.5 inches. The greatest precipitation occurred on the 2d, 3d, 8th, 15th, and 23d. That of the 2d, which was the greatest, and the 15th, was exclusively rainfall, while that of the 8th and 23d was partly rain and partly snow and sleet. The greatest local daily rainfall occurred on the 2d, at Bolivar, and was three inches. The above rains were all general. From the 18th to the 31st, inclusive, were general rains and snows, but mostly light, excepting that of the 23d. There were only two days during the month free from precipitation—the 11th and 17th.

There were several snowfalls during the month, the greatest being on the 8th and 9th. The mean depth that fell was 5.77 inches.

At Paris the observer reports fifteen days on which the sun was not seen.

The observer at Grief reports the Alleghany Mountains covered with snow almost to their base at the close of the month; no snow in the lowlands.

The observer at Parksville reports the Oconee River frozen over on the 10th; the ice six inches thick on the 13th, and the ice breaking up on the 16th.

The observer at Riddleton reports ice eight to twelve inches thick from the 10th to the 16th; it disappeared on the 17th.

During the month, through the kindness of Gen. W. B. Hazen, Chief Signal Officer, ten stations were established in the state for the purpose of receiving the daily weather indications and displaying them by signal flags. These stations were located as follows: Jackson, Milan, Trenton, Clarksville, Gallatin, New Middleton, Murfreesborough, Shelbyville, Fayettsville, and Athens. From the reports from these stations it seems that the percentage of verifications from the time the stations were established to the close of the month was for temperature about 85 per cent., and for weather about 77 per cent. Some of the stations reported 100 per cent. of verifications of temperature. During the month the percentages of verifications of the predictions according to the signals displayed daily from the signal office in Nashville were for temperature 93.5 per cent., and weather 87.1 per cent.

It is gratifying to know that the display of the weather predictions by signal flags at the various stations has already proved of great benefit to the farmers and others in the vicinity of the stations, and it is to be hoped that these benefits will be further extended by the establishment of additional stations in the near future.

State summary.

Mean temperature, 30°.47; highest temperature, 61°, on the 26th, at Knoxville; lowest temperature, —23°, on the 11th, at Sunbright; range of temperature, 84°; mean monthly range of temperature, 68°.21; greatest monthly range of temperature, 80°, at Greeneville; least monthly range of temperature, 61°, at Parksville; mean daily range of temperature, 12°.74; greatest daily range of temperature, 44°, on the 13th, at Fostoria; least daily range of temperature, 1°, on the 5th, at Careyville, Riddleton, and Trenton; mean of maximum temperatures, 58°.27; mean of minimum temperatures, —10°.74.

Mean depth of rainfall, 5.06 inches; mean daily rainfall, 0.163 inch; greatest rainfall, 8.90 inches, at Fostoria; least rainfall, 1.22 inches, at Warner; greatest local daily rainfall, 3.00 inches, on the 2d, at Bolivar; days of greatest rainfall, 2d, 3d, 8th, 15th, 23d; day of greatest rainfall, 2d.

Average number of days on which rain or snow fell, 14; average number of clear days, 5; average number of fair days, 7; average number of cloudy days, 19.

Mean depth of snowfall, 5.77 inches; greatest depth of snowfall, 16.50 inches, at Clementsville; least depth of snowfall, 0.60 inch, at Chattanooga.

Days without precipitation, 11th, 17th.

Warmest days, 1st, 2d, 3d, 26th; coldest days, 9th, 11th, 12th.

Prevailing wind, northwest.

The following is an extract from a meteorological record for the winter months of 1835, and 1851 to 1857, also a table showing the comparison between the temperature for January, 1857 and 1886, furnished by Dr. W. W. Anderson, voluntary observer at Stateburg, South Carolina:

1835.—February 8th: the thermometer at sunrise was 2° below zero; this was the coldest day ever known in South Carolina and the southern country generally; pomegranate and fig trees were killed, as were also nearly all of the Pride of India trees, even the oldest shared the same fate; all orange trees as far south as Florida were killed; the ground froze a foot deep, and continued frozen for more than a week before it began to thaw.

1851.—December 17th: the thermometer in the open air at sunrise was 16°; on the 18th it was 14°, and on the morning of the 19th it was 22°; ice from three to four inches thick formed on ponds.

1852.—January 14th: the thermometer at sunrise stood at 19°, and ice on ponds was from one and one-half to two inches thick; on the 20th the thermometer stood at 6° at sunrise, it was the coldest night since February, 1835. The thermometer at sunrise on the 21st was 24°; on the 22d, 22°; on the 23d, 18°; on the 24th, 27°; and on the 25th, 24°.

1853.—In January there was a slight freeze, but ice did not form much over half an inch thick and no more ice formed that winter.

1854–'55.—The ice at no time during the winter of these years was thick

enough to collect. After an uncommonly long continuance of dry weather (there being an uninterrupted drought of more than three months), the weather began to change about the middle of December and continued changeable to the end of the year; on Christmas evening there was a thunder-storm, and on the 29th there was a heavy fall of rain, with thunder and lightning.

1856.—January 4th: the thermometer stood during the day at 36°, the weather was very cloudy and the wind northeast; after sunset the temperature fell to 30° and the rain and sleet began to fall, which increased as the night advanced, and loaded the trees everywhere with a weight of ice too thick for them to bear and many branches were broken off; the sleet continued to fall until late on the morning of the 5th; the limbs of trees were breaking and falling in every direction during the whole of the 5th, and until the morning of the 6th, the scene of devastation presented was never before witnessed by the oldest inhabitants of the country; on Thursday, January 10th, the temperature was 17°, and ice nearly an inch thick; on the 11th the thermometer stood at 19°; on the 12th more sleet fell, and on Sunday (13th) the trees were again covered with ice, presenting the same brilliant appearance as on the 6th. On Wednesday, the 23d, the temperature was 14°, and the weather clear and bright; the thermometer on the 24th recorded 17°; on the 25th, 24°; on the 26th, 28°; on the 27th 29°; on the 28th, 27°, and on the 29th, 24°. On the 26th there was some snow, and occasionally throughout the day, sleet; during the night there was a heavy fall of sleet, which covered the trees and ground with ice; on Monday (28th) the sun rose clear, and shone brightly, kindling up millions of the most brilliant diamonds of every hue over the whole face of the country, which were soon liquified. On the 29th ponds were covered with ice from two to four inches thick which had been forming for the past week; on the 30th the thermometer was 26°, and the weather clear; 31st, thermometer 24°, and the ground frozen hard; this was the coldest January ever experienced by the oldest inhabitants of this country; there has been in some years one or two colder days, but never, in the remembrance of any one, such a long continuance of freezing weather.

1857.—January 13th: ice two inches thick was gathered for ice-houses; on the 18th it began to rain about 3 a. m. and continued until 9 a. m. when it began to sleet, which at 10 a. m. turned to snow, the temperature having fallen to 32°, the wind being from the northeast; the snow continued steadily all day with strong north and northeast winds, the thermometer falling from three to four degrees every hour until 4 p. m., when it stood at 12°; the snow at sunset was three or four inches deep; the ground not being frozen when the snow began the most that fell in the beginning melted; on the 19th the thermometer stood at 8°, and ice on the ponds was nearly two inches thick, which on the 22d had increased to four inches; there was a very little abatement in the cold on the 24th, ice on ponds was five inches thick and the ground was frozen seven or eight inches deep by actual measurement; this January was colder than even the last. The thermometer at sunrise of the 19th was 8°, and at 3 p. m. 22°; on the 20th it stood at 13° and 32° at the same hours; 21st, 32° and 35°; 22d, 14° and 28°; 23d, 13° and 23°; 24th, 20° and 35°.

The following summary will show approximately the difference between the mean temperature of January 1857 and 1886:

	1857.		1886.				
	Sunrise.	3 p. m.	7 a. m.	2 p. m.	Monthly mean.	Max.	Min.
	°	°	°	°	°	°	°
Monthly mean	28.9	39.3	33.4	43.9	39.0	45.4	32.1

The following table shows the temperature of the seven coldest consecutive days in 1857 and 1886:

	1857.		1886.					
Date.	Sunrise.	3 p. m.	Date.	7 a. m.	2 p. m.	Daily mean.	Max.	Min.
	°	°		°	°	°	°	°
18	36.0	13.0	9	20.0	21.0	17.8	22.0	15.0
19	8.0	22.0	10	10.0	22.0	17.0	24.0	10.0
20	13.0	32.0	11	8.0	17.0	12.8	17.0	8.0
21	32.0	35.0	12	6.0	21.0	17.2	22.0	6.0
22	14.0	28.0	13	9.0	30.0	21.8	31.0	9.0
23	13.0	23.0	14	15.0	35.0	26.5	35.0	15.0
24	20.0	35.0	15	23.0	43.0	36.0	43 0	23.0
Mean	19.4	26.9		13.0	27.0	21.3	29.7	12.3

The mean temperature for January, 1886, 39°.0, is 5°.1 below the average for the past five years.

ERRATUM.

On page 300 in the REVIEW for December, 1885, in the table "Deviations from normal temperatures," Webster, Day county, Dakota, instead of the data as given, read: 12°.8, 3, 23°.2, +10.4.